

December 2008

# DEFENSE INVENTORY

## Management Actions Needed to Improve the Cost Efficiency of the Navy's Spare Parts Inventory



Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>DEC 2008</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2008 to 00-00-2008</b>	
4. TITLE AND SUBTITLE <b>Defense Inventory. Management Actions Needed to Improve the Cost Efficiency of the Navy's Spare Parts Inventory</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>U.S. Government Accountability Office, 441 G Street NW, Washington, DC, 20548</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>54</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			



Highlights of [GAO-09-103](#), a report to congressional requesters

## Why GAO Did This Study

Since 1990, GAO has designated the Department of Defense's (DOD) inventory management as a high-risk area. It is critical that the military services and the Defense Logistics Agency effectively and efficiently manage DOD's secondary inventory to ensure that the warfighter is supplied with the right items at the right time. It is also imperative that they maintain good stewardship over the billions of dollars invested in their inventory. GAO reviewed the Navy's management of secondary inventory and determined (1) the extent to which on-hand and on-order secondary inventory reflected the amount needed to support current requirements and (2) causes for the Navy's having secondary inventory in excess of current requirements or, conversely, for having inventory deficits. To address these objectives, GAO analyzed Navy secondary inventory data (spare parts such as aircraft and ship engines and their components and accessories) from fiscal years 2004 through 2007.

## What GAO Recommends

GAO recommends that the Navy strengthen inventory management by incorporating cost-efficiency metrics and goals, evaluating and improving demand forecasting procedures, revising inventory management practices to better accommodate demand fluctuations, and enhancing oversight through the chief and deputy chief management officers. DOD concurred with GAO's recommendations.

To view the full product, including the scope and methodology, click on [GAO-09-103](#). For more information, contact William M. Solis at (202) 512-8365 or [solisw@gao.gov](mailto:solisw@gao.gov).

# DEFENSE INVENTORY

## Management Actions Needed to Improve the Cost Efficiency of the Navy's Spare Parts Inventory

### What GAO Found

For the 4-year period GAO examined, the Navy had significantly more inventory than was needed to support current requirements. The Navy also experienced some inventory deficits, though to a far lesser extent. GAO's analysis of inventory data identified an annual average of about \$18.7 billion of Navy secondary inventory for fiscal years 2004 to 2007, of which about \$7.5 billion (40 percent) exceeded current requirements. About half of the \$7.5 billion of inventory exceeding current requirements was retained to meet anticipated future demands, and the remainder was retained for other reasons or identified as potential excess. Based on Navy demand forecasts, inventory that exceeded current requirements was sufficient to satisfy several years, or even decades, of anticipated supply needs. Also, a large proportion of items that exceeded current requirements had no projected demand. The Navy also had an annual average of about \$570 million of inventory deficits over this 4-year period. Some items experienced persistent deficits for the 4 years covered in GAO's review.

Navy inventory did not align with current requirements over this 4-year period because (1) the Navy has not established the cost efficiency of its inventory management, (2) its demand forecasting effectiveness is limited and requirements for items may change frequently after purchase decisions are made, and (3) it has not adjusted certain inventory management practices in response to the unpredictability in demand. As a result, the Navy had billions of dollars in excess inventory against current requirements each year. DOD's supply chain management regulation requires the military services to take several steps to provide for effective and efficient end-to-end materiel support. For example, the regulation directs the components to size secondary item inventories to minimize DOD investment while providing the inventory needed. However, while the Navy has performance measures related to meeting warfighter needs, it lacks metrics and targets for tracking and assessing the cost efficiency of its inventory management. In addition, although Navy managers most frequently attributed the accumulation and retention of inventory exceeding current requirements to changes in demand, the Navy has not systematically evaluated the effectiveness of its demand forecasting. Problems with demand forecasting that contribute to excess inventory include incomplete and inaccurate data and a lack of communication and coordination among key personnel. Finally, the Navy has not adjusted certain management practices—in areas such as initial provisioning, modifying purchase decisions for inventory that is on order and not yet in its possession, and retention—to provide flexibility for responding to changes in demand. First, initial provisioning of spare parts based on engineering estimates can result in the purchase of unneeded stock when these estimates prove to be inaccurate. Second, the Navy's management practices for on-order items limit flexibility in modifying purchase decisions in cases where demand has changed. Third, although prior studies have identified weaknesses in inventory retention practices, the Navy has not implemented recommended corrective actions. Also, the Navy's designation of new chief and deputy chief management officer positions provides an opportunity for enhanced oversight of inventory management improvement efforts. Strengthening the Navy's inventory management—while maintaining high levels of supply availability and meeting warfighter needs—could reduce support costs and free up funds for other needs.

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United States Government Accountability Office  
Washington, DC 20548

December 12, 2008

The Honorable Solomon P. Ortiz  
Chairman  
The Honorable Randy Forbes  
Ranking Minority Member  
Subcommittee on Readiness  
Committee on Armed Services  
House of Representatives

The Honorable Bernie Sanders  
United States Senate

The military services and the Defense Logistics Agency (DLA) procure and manage large supplies of spare parts to keep military equipment operating. At a time when U.S. military forces and their equipment are in high demand, it is critical that the services and DLA effectively and efficiently manage the Department of Defense's (DOD) secondary inventory<sup>1</sup> to ensure that the warfighter is supplied with the right items at the right time. Because the military services and DLA face challenges in competing for resources at a time when the nation faces an increasingly constrained fiscal environment, it is also imperative that they have good stewardship over the billions of dollars invested in their inventory. DOD reported that the total value of its secondary inventory as of September 30, 2007, was about \$82.6 billion.<sup>2</sup> Since 1990, we have identified DOD inventory management as a high-risk area due to ineffective and inefficient inventory management practices and procedures and to excessively high levels of inventory beyond what is needed to support current requirements. These high levels extend to both on-hand and on-order inventory. Inventory in DOD's possession is considered to be on hand. Inventory not in DOD's possession but for which contracts have been awarded or funds have been obligated is considered to be on order.

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<sup>1</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, AP1.1.137 (May 2003). Secondary inventory items include repairable components, subsystems, and assemblies other than major end items (e.g., ships, aircraft, and helicopters), consumable repair parts, bulk items and materiel, subsistence, and expendable end items, including clothing and other personal gear.

<sup>2</sup>These were the most recent data available at the time we began our review.

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In response to your request that we review DOD components' secondary inventory, this report addresses the management of the Navy's secondary inventory. Our objectives were to (1) determine the extent to which the Navy's on-hand and on-order secondary inventory reflects the amount needed to support current requirements and (2) identify causes, if applicable, for the Navy's having secondary inventory in excess of current requirements or, conversely, for having inventory deficits. We previously reported on the management of the Air Force's secondary inventory,<sup>3</sup> and we plan to report separately on the management of the Army's secondary inventory.

To determine the extent to which the Navy's on-order and on-hand secondary inventory reflects the amount of inventory needed to support current requirements, we analyzed fiscal years 2004 through 2007 stratification data,<sup>4</sup> including summary reports and item-specific data as of September 30 for each fiscal year. We determined the total number of items that had more or less than enough inventory to satisfy current requirements, and for each of these items also determined the number and value of parts that were either in excess of or less than needed to satisfy current requirements.<sup>5</sup> In presenting the value of inventory in this report, we converted then-year dollars to constant fiscal year 2007 dollars using DOD Operations and Maintenance price deflators.<sup>6</sup> To determine the primary causes for the Navy having inventory in excess of current requirements or having inventory deficits, we selected a random probability sample of inventory items that met these conditions and sent surveys to Navy inventory personnel who are responsible for item management. Because we used a random probability sample, the results of our survey analysis statistically weight up to represent the population of all Navy items that met our selection criteria. To gain additional

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<sup>3</sup>GAO, *Defense Inventory: Opportunities Exist to Save Billions by Reducing Air Force's Unneeded Spare Parts Inventory*, [GAO-07-232](#) (Washington, D.C.: Apr. 27, 2007).

<sup>4</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, C9.1.2.3 (May 2003). DOD requires each service and DLA to prepare inventory stratification reports semiannually to match assets to requirements. One stratification is as of September 30 (for inventory reporting and funding reviews) and the other is as of March 31 (for budget preparation).

<sup>5</sup>The Navy secondary inventory data are identified by unique stock numbers for each spare part, such as a component for an engine, which we refer to as unique items. The Navy may have in its inventory multiple quantities of each unique item, which we refer to as individual parts.

<sup>6</sup>DOD Comptroller, *National Defense Budget Estimates for FY 2009* (March 2008) p. 47.

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understanding about the management of secondary inventory, we interviewed numerous Navy inventory personnel and discussed 70 items in more detail. Appendix I provides further information on our scope and methodology. We conducted this performance audit from November 2007 to December 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

In this report, we characterize inventory as exceeding current requirements when existing inventory levels are greater than what DOD calls its “requirements objective,” defined as:

“For wholesale stock replenishment, the maximum authorized quantity of stock for an item. It consists of the sum of stock represented by the economic order quantity, the safety level, the repair-cycle level, and the authorized additive levels.”<sup>7</sup>

We used the requirements objective as our baseline because it includes the requirements used to determine when to order new parts (collectively called the “reorder point”). In other words, if the Navy had enough parts to meet the requirements objective, it would not purchase new parts. We use the term “inventory deficit” to describe items that have an amount of on-hand inventory that falls below reorder point thresholds. We used this baseline because it reflected the Navy’s ability to respond to an immediate demand for a secondary inventory item. The categories DOD and the Navy use to characterize and manage inventory are discussed further in the background section of this report.

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## Results in Brief

For the 4-year period we examined, the Navy had significantly more inventory than was needed to support current requirements. The Navy also experienced some inventory deficits, though to a far lesser extent. Our analysis of stratification data identified an annual average of about \$18.7 billion of Navy secondary inventory for fiscal years 2004 through 2007, of which about \$7.5 billion (40 percent) exceeded current requirements.

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<sup>7</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, AP1.1.126 (May 23, 2003). The Navy refers to this inventory level as its “total requirements objective.” The authorized additive levels cited in the definition include wartime reserve stock and inventory for acquisition lead times.



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About half of the \$7.5 billion of inventory exceeding current requirements was retained to meet anticipated future demands, and the remainder was retained for other reasons or identified as potential excess. Based on Navy demand forecasts, inventory that exceeded current requirements had enough parts on hand to satisfy several years, or even decades, of anticipated supply needs. Also, a large proportion of items that exceeded current requirements had no projected demand. Inventory that exceeded current requirements included both serviceable and unserviceable parts, and was predominantly associated with steady programs—that is, programs that were not significantly growing or declining. The Navy also had an annual average of about \$570 million of inventory deficits over this 4-year period, which represented about 7 percent of its annual reorder point requirements. Fewer items had inventory deficits than had excesses, but some items experienced persistent deficits for the 4 years we reviewed.

On the basis of our review, we found that Navy secondary inventory did not align with current requirements over the 4-year period because (1) the Navy has not established the cost efficiency of its inventory management, (2) the Navy's demand forecasting effectiveness is limited and requirements for items may change frequently after purchase decisions are made, and (3) the Navy has not adjusted certain inventory management practices in response to the unpredictability in demand. As a result, the Navy has accumulated and retained billions of dollars in excess inventory against current requirements each year. DOD's supply chain management regulation requires the military services to take several steps to provide for effective and efficient end-to-end materiel support. For example, the regulation directs the components to size secondary item inventories to minimize the DOD investment while providing the inventory needed. However, while the Navy has performance measures for meeting warfighter needs, it lacks metrics and targets for tracking and assessing the cost efficiency of its inventory management. In addition, Navy managers most frequently attributed the accumulation of inventory exceeding current requirements to changes in demand. Although DOD's supply chain regulation states that customer demand shall be part of all DOD components' inventory management decisions and that variance in demand forecasts outside established parameters should be flagged for management analysis and action, the Navy has not systematically evaluated the effectiveness of its demand forecasting. Problems with demand forecasting that contribute to excess inventory include incomplete and inaccurate data and a lack of communication and coordination among key personnel. Another factor contributing to the Navy having inventory that does not align with requirements is its failure

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to adjust certain management practices—in areas such as initial provisioning, on-order management, and retention—to allow for flexible responses to fluctuations in demand. First, initial provisioning of spare parts based on engineering estimates can result in the purchase of unneeded stock when these estimates prove to be inaccurate. Second, the Navy's inventory management practices for on-order items limit flexibility in modifying purchase decisions in cases where demand has changed. Third, although prior studies by our office and the Logistics Management Institute (LMI) have identified weaknesses in DOD components' inventory retention practices, the Navy has neither implemented recommended corrective actions nor ensured that required annual reviews validating its methodologies for making retention decisions are performed. In addition, the Navy has established a new chief management officer and deputy chief management officer responsible for business transformation. These new designations provide an opportunity to enhance oversight of inventory management improvement efforts. Strengthening the Navy's inventory management—while maintaining high levels of supply availability and meeting warfighter needs—could reduce support costs and free up funds for other needs.

To improve the management of Navy secondary inventory, we are recommending that the Navy incorporate cost-efficiency metrics and goals, evaluate and improve demand forecasting procedures, revise inventory management practices to better accommodate fluctuations in demand, and enhance Navy oversight of inventory improvement efforts. DOD, in its comments on a draft of this report, concurred with our recommendations.

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## Background

Under DOD's supply chain materiel management policy, the secondary item inventory should be sized to minimize DOD's investment while providing sufficient inventory to support both peacetime and war requirements.<sup>8</sup> The Offices of the Secretary of Defense and the Navy share the responsibility for management and oversight of the secondary item inventory. The Under Secretary of Defense for Acquisition, Technology, and Logistics is responsible for the uniform implementation of inventory management policies throughout the department, while the Secretary of

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<sup>8</sup>Department of Defense Directive 4140.1, *Supply Chain Materiel Management Policy* (April 2004) establishes policy and responsibilities for materiel management. Department of Defense Supply Chain Materiel Management Regulation 4140.1-R (May 2003) implements this directive.

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the Navy is responsible for implementing DOD inventory policies and procedures. Navy inventory management functions are primarily the responsibility of the Naval Inventory Control Point, a component of the Navy Supply Systems Command that has offices in Philadelphia and Mechanicsburg, Pennsylvania. Aviation and maritime items are managed in Philadelphia and Mechanicsburg, respectively. The Navy prescribes guidance and procedural instructions for computing requirements for its secondary inventory. Navy managers develop inventory management plans for their assigned items, which include developing budgetary requirements for procurement and repair, monitoring and discussing inventory performance with contractors and repair depots, evaluating requests for stocking from individual DOD activities, and processing requisitions for materiel that cannot be satisfied by automated processes.

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### Value of Navy's Secondary Inventory Decreased Since 2004

DOD requires each service and DLA to semiannually prepare inventory stratification reports, which are primarily used to determine procurement and repair budget requirements, and potential excess or reutilization stock.<sup>9</sup> Stratification is a process that identifies and prioritizes requirements and allocates inventory to those requirements based on availability. DOD annual stratification reports show that for the 4 years covered in our review, the value of the Navy's secondary inventory decreased both in dollar amounts and as a percentage of DOD's overall secondary inventory (see table 1).

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<sup>9</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, C9.1.2.3 (May 2003).

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**Table 1: Value of DOD and Navy Secondary Inventory (Fiscal Years 2004-2007)**

Dollars (in billions)			
Fiscal year	DOD secondary inventory	Navy secondary inventory	Percentage of DOD secondary inventory held by the Navy
2004	\$84.5	\$25.9	31
2005	83.7	22.5	27
2006	87.6	21.4	24
2007	82.6	18.6	23

Source: GAO analysis of DOD data.

Notes: Values are expressed in constant fiscal year 2007 dollars. DOD values inventory at latest acquisition cost, with reductions for reparable inventory in need of repair and salvage prices for potential reutilization/disposal stock.

While the total reported value of DOD's secondary inventory decreased by almost \$2 billion from fiscal year 2004 through fiscal year 2007, the reported value of the Navy's inventory decreased by more than \$7 billion. According to Navy inventory managers, this decrease was attributable to the following factors: (1) a greatly accelerated disposal rate for items in the F-14 program, (2) an accounting cleanup of records on unserviceable parts in transit, (3) sales of inventory that had accrued in support of major war operations in 2002 and 2003, (4) an increase in aviation assets that could not be repaired and therefore were disposed of, and (5) the transfer of inventory control for consumable aviation items from the Navy to DLA.

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### Navy's Process for Determining Needed Amount of Secondary Inventory

The Navy uses a process called requirements determination to calculate the respective amounts of inventory it either needs to have available in storage (on hand) or needs to purchase (on order). A central database called the Master Item File provides data for the requirements determination process. The Navy also uses the Master Item File to develop a stratification report showing the amount of inventory allocated to meet specific requirements, including operating and acquisition lead time requirements.

- Operating requirements include the war reserves authorized for purchase; customer-requisitioned materiel that has not yet been shipped (also known as due-outs); a safety level of reserve to be kept on hand in case of minor interruptions in the resupply process or unpredictable fluctuations in demand; minimum quantities for essential items for which demand cannot normally be predicted (also referred to as numeric stockage objective or

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- insurance items); and inventory reserve sufficient to satisfy demand while broken items are being repaired (also referred to as repair cycle stock).
- Acquisition lead time requirements include administrative lead time requirements, which refer to inventory reserves sufficient to satisfy demand<sup>10</sup> from the time that the need for replenishment of an item is identified to the time when a contract is awarded for its purchase or an order is placed; and production lead time requirements, which refer to inventory reserves sufficient to satisfy demand from the time when a contract is let or an order is placed for inventory to the time when the item is received.

When the combined total of on-hand and on-order inventory for an item drops to a threshold level—called the reorder point—the item manager may place an order for additional inventory of that item, to avoid the risk of the item’s going out of stock in the Navy’s inventory. The reorder point includes both operating requirements and acquisition lead time requirements. An economic order quantity—the amount of inventory that will result in the lowest total costs for ordering and holding inventory—is automatically calculated by a computer program and is added to the order. The reorder point factors in demand for inventory items during the reordering period so that Navy managers can replace items before they go out of stock, and a safety level to ensure a supply of stock during interruptions in production or repair. A purchase request can be terminated or modified if requirements change.

These requirements collectively constitute the requirements objective, which we refer to as the Navy’s current requirements in this report. An assessment of the Navy’s requirements or requirements determination process was outside the scope of our review. In accounting for its inventory, the Navy uses the stratification process to allocate, or apply, inventory to each requirement category. On-hand inventory in serviceable condition is applied first, followed by on-hand inventory in unserviceable condition.<sup>11</sup> On-order inventory is applied when on-hand inventory is unavailable to be applied to requirements. We refer to situations when on-hand inventory is insufficient to satisfy reorder point requirements as inventory deficits.

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<sup>10</sup>To determine acquisition lead time requirements for reparable parts the Navy uses “attrition demand,” which is the number of parts that need to be procured to make up for parts that do not survive the repair process.

<sup>11</sup>The Navy retains unserviceable parts in case they are needed to support requirements. These parts would be repaired prior to being issued to a customer.

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Inventory that exceeds current requirements may include

- inventory that satisfies 2 years of projected future demand, which together with current requirements is known as the approved acquisition objective;<sup>12</sup>
- economic retention inventory, which exceeds the approved acquisition objective but has been deemed more economical to keep than to discard because it will likely be needed in the future;
- contingency retention inventory, which exceeds the economic retention inventory but is retained for specific contingencies; and
- potential excess materiel,<sup>13</sup> which exceeds contingency retention inventory and has been identified for possible disposal but has potential for reutilization.

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## A Significant Portion of the Navy's Secondary Inventory Exceeded Current Requirements

Our analysis of Navy secondary inventory data for the 4-year period we examined showed that, on average, about \$11.3 billion (60 percent) of the average annual total inventory value of \$18.7 billion was needed to meet current requirements and \$7.5 billion (40 percent) exceeded current requirements. About half of the inventory that exceeded current requirements was being retained for demands anticipated within 2 years, and the remainder was held as economic retention inventory, contingency retention inventory, or marked as potential excess. According to the Navy's demand forecasts for items exceeding current requirements in fiscal years 2004 and 2007, inventory levels of some items were sufficient to meet many years and sometimes decades of demand. A large proportion of items that exceeded current requirements had no projected demand. Repairable inventory that exceeded current requirements included both serviceable and unserviceable parts, and the proportion of items associated with steady programs—that is, programs that were not significantly growing or declining—was similar for inventory meeting and exceeding current requirements. Relatively few inventory deficits were identified, but these persisted for some items during the 4 years we reviewed.

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<sup>12</sup>DOD uses the approved acquisition objective for budgeting purposes.

<sup>13</sup>Potential Excess" is a term used by the Navy to describe materiel that Department of Defense Supply Chain Management Regulation 4140.1-R would categorize as "Potential Reutilization and/or Disposal Materiel." Potential reutilization and/or disposal materiel is defined as materiel identified by an item manager for possible disposal, but with potential for reutilization.

About \$7.5 Billion, or 40 Percent, of the Navy’s On-Hand and On-Order Inventory Value Exceeded Current Requirements Each Year

Our analysis of Navy secondary inventory data showed that, on average, about \$11.3 billion (60 percent) of the total annual inventory value was needed to meet current requirements, whereas \$7.5 billion (40 percent) exceeded current requirements. Measured by number of parts, these percentages were reversed: 40 percent of the parts applied to current requirements on average each year, and the remaining 60 percent exceeded current requirements. Our data for the 4-year period revealed that 121,380 (65 percent) of the Navy’s 186,465 unique items with reported inventory had parts in excess of current requirements. Table 2 shows the stratification of Navy secondary inventory for the 4-year period, including inventory meeting requirements and inventory exceeding requirements.

Table 2: Stratification of Navy Fiscal Year Secondary Inventory (Annual Average for Fiscal Years 2004-2007)

Dollars (in billions)					
Annual average	Items	Parts (in millions)	Percentage of total parts	Value	Percentage of total value
Total inventory	186,465	19.1	100%	\$18.7	100%
Inventory meeting current requirements					
Operating requirements	93,153	2.2	11	7.6	41
Acquisition lead time	34,286	3.5	18	1.9	10
Economic order quantity	172,869	2.0	10	1.8	9
Subtotal	184,606	7.6	40	\$11.3	60%
Inventory exceeding current requirements					
Future demand	N/A	1.1	6	3.7	20
Economic retention	81,419	1.7	9	1.2	6
Contingency retention	26,052	1.2	6	0.7	4
Potential excess	52,634	7.4	39	1.8	10
Subtotal	121,380	11.4	60	\$7.5	40%

Source: GAO analysis of Navy data.

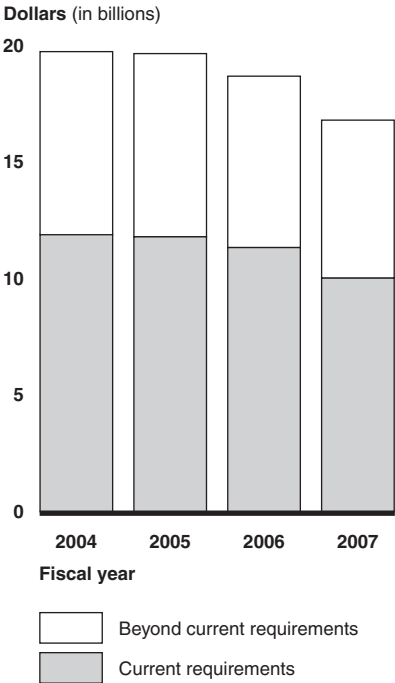
Notes: Values are expressed in constant fiscal year 2007 dollars and are less cost recovery rates (overhead charges).

Some of the totals may not add up due to rounding.

The data in table 2 show that the Navy has applied a significant amount of inventory to future demand as well as to current requirements. On average, about 1.1 million parts comprising 6 percent of total parts and 20 percent of total inventory value were designated for future demand. Furthermore, the average value of these parts (\$3.7 billion) was nearly half the average value of the parts needed to meet annual operating

requirements (\$7.6 billion). The balance between inventory meeting current requirements and inventory exceeding current requirements stayed relatively constant from year to year (see fig. 1).

**Figure 1: Navy Secondary Inventory Meeting and Exceeding Current Requirements (Fiscal Years 2004-2007)**



Source: GAO analysis of Navy data.

Note: Values are expressed in constant fiscal year 2007 dollars.

The secondary inventory data further showed that while the aviation community had fewer spare parts than the maritime community, these parts constituted a higher average value; conversely, the maritime community had more parts but at lower average value. Table 3 shows the average number and value of parts exceeding current requirements for each of these communities at the end of each fiscal year.



**Table 3: Aviation and Maritime Inventory Exceeding Current Requirements (Annual Average for Fiscal Years 2004-2007)**

	Number of parts (millions)	Percent	Value of parts (billions)	Percent
Aviation	1.7	15	\$5.6	75
Maritime	9.7	85	1.8	25
<b>Total</b>	<b>11.4</b>	<b>100</b>	<b>\$7.5</b>	<b>100</b>

Source: GAO analysis of Navy data.

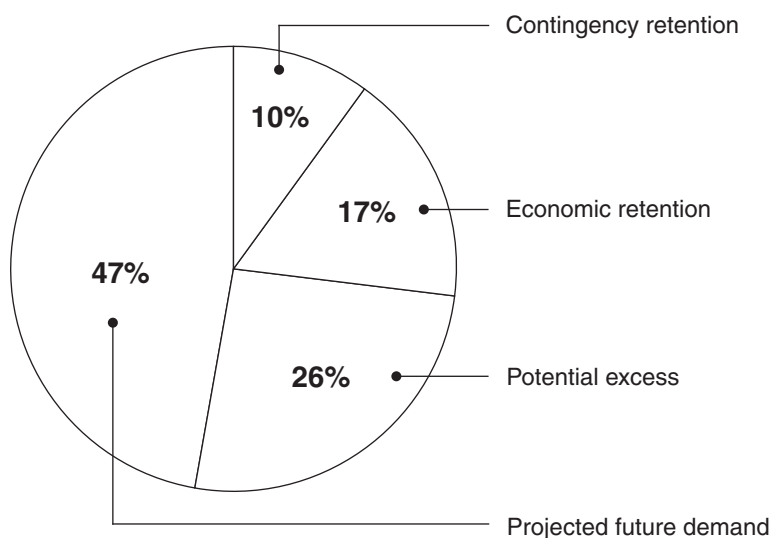
Notes: Totals may not add up due to rounding.

Values are expressed in constant fiscal year 2007 dollars and are less cost recovery rates (overhead charges).

## Inventory Excess to Current Requirements Was Retained for Anticipated Future Needs

Of the nearly \$7.5 billion in Navy secondary inventory that exceeded current requirements in the time frame we examined, about half was being retained for demands anticipated within 2 years, while the remainder was being retained either as economic retention inventory, contingency retention inventory, or potential excess (see fig. 2).

**Figure 2: Stratification of Inventory Exceeding Current Requirements by Average Value (Fiscal Years 2004-2007)**



Source: GAO analysis of Navy data.

With regard to on-order inventory, the Navy marked approximately \$10 million (1 percent) of this inventory each year as potential excess to be

reviewed for possible disposal. This means that demands had decreased significantly since the time the order was placed, yet the Navy had not terminated the order. Navy managers told us that on-order inventory marked as potential excess is routinely cancelled to prevent the immediate disposal of new inventory. We did not independently verify whether this practice was consistently followed. Table 4 shows the amount of potential excess inventory the Navy had on order at the end of fiscal years 2004 to 2007.

**Table 4: Navy On-Order Inventory That Was Identified as Potential Excess (Fiscal Years 2004-2007)**

Dollars (in millions)	Fiscal year			
	2004	2005	2006	2007
Aviation	\$7.2	\$10.1	\$5.6	\$7.6
Maritime	4.0	1.3	2.1	3.7
<b>Total</b>	<b>\$11.1</b>	<b>\$11.4</b>	<b>\$7.6</b>	<b>\$11.3</b>

Source: GAO analysis of Navy data.

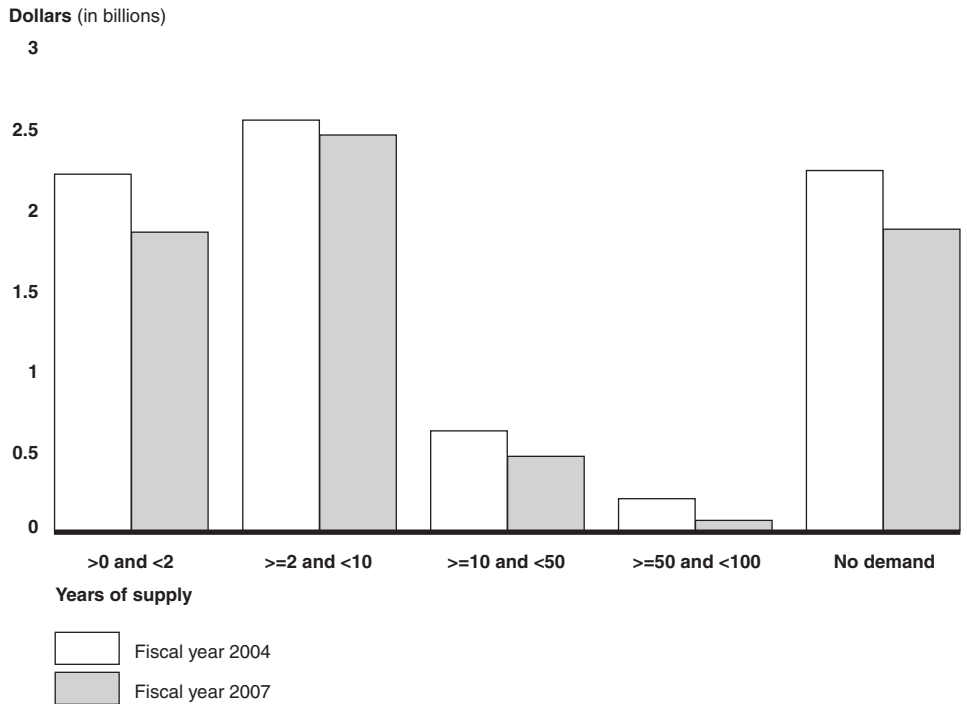
Notes: Values are expressed in constant fiscal year 2007 dollars and are less cost recovery rates (overhead charges).

Some of the totals may not add up due to rounding.

Excess Inventory Was Sufficient to Meet Many Years of Projected Demands

The Navy’s forecasts for items with a recurring demand in fiscal years 2004 and 2007 showed that inventory for some items exceeded the current requirements necessary to meet many years and sometimes decades of demand. In addition, a substantial amount of this inventory showed no projected demand. The results of this analysis are shown in figure 3.

**Figure 3: Years of Supply Available for Inventory Exceeding Current Requirements (Fiscal Years 2004 and 2007)**



Source: GAO analysis of Navy data.

Notes: We identified the annual demand forecast for individual items in the fiscal years 2004 and 2007 September stratification reports. We removed nonrecurring demands from the excess inventory, and then divided the remainder by the annual demand forecast to obtain the number of years of supply the inventory levels would satisfy.

Values are expressed in constant fiscal year 2007 dollars.

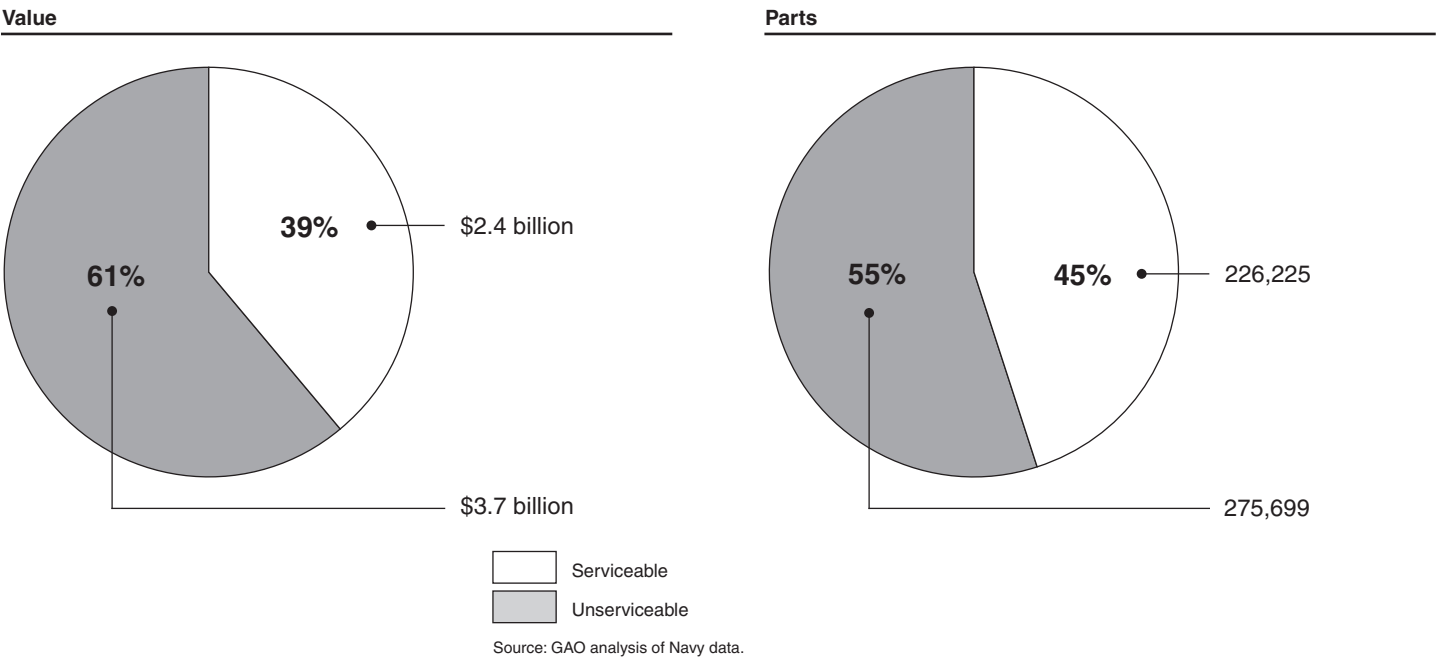
As shown in figure 3, about \$1.9 billion (27 percent) of the inventory exceeding current requirements in fiscal year 2007 was sufficient to satisfy 2 years of demand, \$2.5 billion (36 percent) was sufficient to meet between 2 and 10 years of supply, and \$0.5 billion (8 percent) was sufficient to meet demand for 10 years or more. In addition, the Navy in fiscal year 2007 had \$1.9 billion (28 percent) of inventory exceeding current requirements for which there was no forecasted demand. About \$1.1 billion (60 percent) of these items were being retained because of economic or contingency retention requirements, and the remaining \$0.8 billion (40 percent) were considered for disposal or reutilization. In commenting on a draft of this report, the Navy stated that a majority of these items are in low demand, are used on older weapon systems, and can no longer be procured, so the

Navy will retain inventory as requirements trend down. We could not independently verify the Navy's statement using the stratification data, and the Navy did not provide supporting data.

Inventory Exceeding Current Requirements Included Both Serviceable and Unserviceable Assets

Reparable inventory that exceeded current requirements included both serviceable and unserviceable parts. The Navy pays storage costs for all items regardless of condition. Based on DLA data, we estimate that the Navy incurred at least \$18 million in storage costs for its wholesale secondary inventory that exceeded current requirements in fiscal year 2007. In fiscal year 2007, serviceable parts constituted about 45 percent of the total reparable parts exceeding current requirements and about 39 percent of the total value (see fig. 4).

Figure 4: Condition of Reparable Inventory That Exceeded Current Requirements (Fiscal Year 2007)



Program Status Was Not Significantly Different for Items Exceeding Current Requirements and Items Meeting Current Requirements

The proportion of Navy secondary inventory associated with steady programs was similar for inventory meeting and exceeding current requirements. Each Navy inventory item is assigned a program status that indicates whether the item or the item's higher assembly is part of a weapon system program that is growing, staying steady, declining, or obsolete. In fiscal year 2007, 81 percent of the value of aviation parts and 79 percent of the value of maritime parts which met current requirements

were associated with steady programs. For items exceeding current requirements, these proportions were similar—79 and 73 percent for aviation and maritime items, respectively. Table 5 shows the percentage of items in each category by program status.

**Table 5: Program Status of Inventory as a Percentage of Inventory Value (Fiscal Year 2007)**

Inventory	Percent increasing	Percent steady	Percent decreasing	Percent obsolete <sup>a</sup>
<b>Meeting current requirements:</b>				
Aviation <sup>b</sup>	15%	81%	4%	0%
Maritime <sup>c</sup>	14	79	7	<sup>a</sup>
<b>Exceeding current requirements:</b>				
Aviation <sup>b</sup>	5%	79%	12%	5%
Maritime <sup>c</sup>	17	73	11	<sup>a</sup>

Source: GAO analysis of Navy data.

<sup>a</sup>Managers of maritime items do not assign items to the obsolete status code.

<sup>b</sup>Aviation program status data were current as of March 2008.

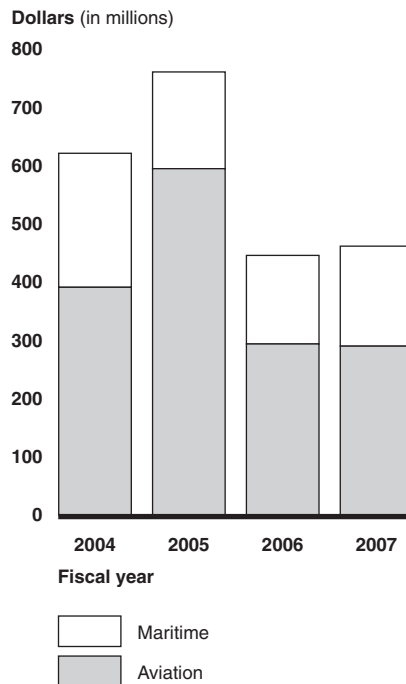
<sup>c</sup>Maritime program status data were current as of September 2008.

Relatively Few Inventory Deficits Were Identified, but Some Items Had Persistent Deficits

The Navy had inventory deficits for some items—that is, an insufficient level of inventory on hand to meet the reorder levels identified in its current requirements. As of the September 30 stratification report date for fiscal years 2004 through 2007, the Navy had insufficient on-hand inventory to meet reorder-level requirements for an average of about 15,000 items annually, totaling about \$570 million in inventory deficits each year. Normally, inventory managers will place an order for new parts when an item’s inventory falls to the reorder level, but in fiscal year 2007 there were a total of 13,775 items with an inventory deficit, of which 6,315 (46 percent) had no inventory on order. In commenting on our report the Navy said some of these deficit items will not be procured because they are obsolete or have been replaced by other items. However, of the 6,315 items on order, only 840 were in declining programs where items would not be procured. Further, 21 percent of items with deficits had unfilled requisitions from previous time periods, indicating that some items had persistent deficits over time. Navy inventory managers said that deficits occur and can persist for various reasons, including cases in which a supplier is no longer in business or producing the part needed, and a new, qualified supplier must be identified to produce the item. Our random

sample of items with inventory deficits in fiscal year 2007 showed that 35 percent of these items had an inventory deficit in each of the 4 years we reviewed. We could not determine the criticality of these deficits because this information is not available in stratification reporting. In terms of number of parts, the Navy had fewer inventory deficits for aviation items than for maritime items, but the aviation items constituted a higher average value. Figure 5 shows the value of Navy's inventory deficits for each of the fiscal years included in our review.

**Figure 5: Value of Inventory Deficits (Fiscal Years 2004-2007)**



Source: GAO analysis of Navy data.

Note: Values are expressed in constant fiscal year 2007 dollars and are less cost recovery rates (overhead charges).

However, the Navy would need considerably more inventory to meet its total requirements objective for these items. For example, when both on-hand and on-order inventory are included, in fiscal year 2007 the Navy had a total deficit against the total requirements objective of about 880,000 parts valued at about \$1.5 billion. This amount is about three times the level of its on-hand deficits alone.

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## Several Factors Contributed to the Navy's Having Large Inventory Levels in Excess of Current Requirements

Our review identified several factors that contributed to the Navy's having secondary inventory that did not align with current requirements, including significant levels of inventory that were in excess of these requirements over the 4-year period. While the Navy strives to provide effective supply support in meeting warfighter needs and reports meeting or almost meeting many of its own supply availability targets, it has placed less emphasis on doing so at least cost. The Navy has not established metrics and goals for tracking and assessing the cost efficiency of its inventory management. In addition, although changes in demand account for much of the inventory in excess of current requirements, the Navy has not systematically evaluated why demand forecasting is unpredictable and how to better manage it. Further, the Navy has not adjusted certain inventory management practices to allow for flexibility in responding to unpredictable demand.

In addition, our review noted that although the Navy's newly established chief management officer and deputy chief management officer will oversee business transformation, the Navy has not yet defined their respective roles in overseeing inventory management improvement efforts. These new designations provide an opportunity to enhance oversight of such efforts.

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## Navy Has Not Established Metrics and Goals for Tracking and Assessing the Cost Efficiency of Inventory Management

Although the Navy has emphasized the need to meet warfighter needs as measured by supply support performance metrics and goals, it has not established metrics and goals to track and assess the cost efficiency of its inventory management practices. As a result, the Navy does not know whether it is meeting inventory requirements at least cost as required by DOD's supply chain management regulation.

DOD's supply chain management regulation requires the military services to take several steps to provide for effective and efficient end-to-end materiel support. The regulation also sets out a number of management goals and directs the components to take a number of steps including sizing secondary item inventories to minimize the DOD investment while providing the inventory needed; considering all costs associated with materiel management in making best-value logistics decisions; balancing the use of all available logistics resources to accomplish timely and quality delivery at the lowest cost; and measuring total supply chain performance based on timely and cost-effective delivery. To ensure efficient and effective supply chain management, the regulation also calls for the use of metrics to evaluate the performance and cost of supply chain operations. These metrics should, among other things, monitor the efficient use of

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DOD resources and provide a means to assess costs versus benefits of supply chain operations.<sup>14</sup> However, the regulation does not prescribe specific cost metrics and goals for the services to use to track and assess the efficiency of their inventory management practices.

According to Navy officials, they have processes and controls for efficiently managing secondary inventory. For example, they use a requirements-setting process for determining secondary items necessary to meet performance goals, while evaluating the trade-offs between the requirements and acceptable risk of being out of stock. They also compare requirements to available assets and identify funding needed during the next 2-year budget period. After budget approval, they use a supply demand review process and repair workload forecasting to initiate procurements and plan repairs throughout the year. The supply demand reviews enable them to determine significant requirement changes and recommend additional procurement or termination of existing procurements. They also stated that the semiannual stratification review acts as a check and balance. They noted that Navy item managers are required to meet goals that ensure that the Navy does not unnecessarily build inventories but rather balances the costs for terminating a contract against that of initiating a new contract in the near future. They said they are confident that these processes and controls work because the Navy is able to meet required performance goals at budgeted costs.

Moreover, the Navy uses metrics to track and assess performance toward meeting inventory support goals. These include metrics showing supply material availability and customer wait time.<sup>15</sup> For example, the Navy tracks the extent to which it is meeting supply material availability goals—which are set at 85 percent (except for nuclear propulsion-related material, which has a goal of 95 percent)—as well as average customer wait time. Recent data show that the Navy generally meets or almost meets these goals, although we did not independently verify these performance data during our review. The Navy also measures financial performance by the extent to which budgeted amounts are obligated and net sales plans are achieved. In this way inventory managers may be

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<sup>14</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, C1.5.1 (May 2003).

<sup>15</sup>Supply material availability is the percent of time that material requisitioned is available. Customer wait time is the total elapsed time between the issuance of an order and the satisfaction of that order.



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accountable for goals related to supply material availability and customer wait time, as well as budget performance.

The Navy, however, has not established metrics and goals for determining whether it is meeting its performance goals at least cost. For example, it has not established a metric related to its cost efficiency in meeting the supply material availability goal. The overall secondary inventory data we analyzed show that the Navy carried about \$1.66 in inventory for every \$1 in requirements to meet its supply material availability goal during the 4-year period of fiscal years 2004 through 2007. Such a metric, in combination with other cost metrics and established goals, could give the Navy the capability to track trends and assess progress toward achieving greater cost efficiency. Because cost metrics and goals have not been established, Navy managers are not held accountable and lack incentives for achieving efficient supply support. Measuring performance goals such as supply material availability and average customer wait time without also tracking cost metrics encourages higher levels of inventory. As a result, the Navy carries billions of dollars in excess inventory against current requirements each year without having to demonstrate that these inventory levels are cost effective.

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### Demand Forecasting Procedures Have Not Been Systematically Evaluated

Our review showed that unpredictability in forecasting demand for spare parts was a primary cause of the Navy's inability to align inventory levels with current requirements. DOD's supply chain regulation states that customer demand shall be part of all DOD components' inventory management decisions, components shall not stock an item that does not have any possibility of future demand, and variance in demand forecasts outside established parameters should be flagged for management analysis and action.<sup>16</sup> According to Navy managers, demand is the single most significant data element for forecasting requirements and a driving factor in identifying the reorder point. While Navy managers agreed that accurately forecasting demand is a long-standing difficulty, they said that they forecast demand as best as they can and could not readily identify ways to significantly improve on their current procedures. However, they could not show where the Navy has systematically evaluated its demand forecasting procedures to identify areas where forecasts have been consistently inaccurate in order to correct any systemic weaknesses.

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<sup>16</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, C2.5.1.1, and C2.5.1.6 (May 2003).

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Another related difficulty, according to Navy managers we interviewed, is a lack of timely communications among stakeholders, including promptly relaying changes in programs and other decisions that affect purchases of spare parts. More prompt communication of demand updates could help to mitigate the effects of demand fluctuations, they said.

Navy item managers who responded to our survey most frequently cited changes in demand as the reason inventory did not align with current requirements. Changes may include demand decreasing, fluctuating, or not materializing at all, resulting in inventory exceeding current requirements; or demand increasing, resulting in inventory deficits. Table 6 shows the results of our representative survey of items with inventory excesses (384 items), and table 7 shows the results of our survey for items with inventory deficits (40 items).

**Table 6: Estimated Frequency of Reasons for Navy Having Inventory That Exceeded Current Requirements**

<b>Cause</b>	<b>Sample count</b>	<b>Estimated frequency and 95%, two-sided confidence interval<sup>a</sup></b>
Demands decreased, fluctuated, or did not materialize	201	54% (48.42% to 59.10%)
Changes occurred in wear-out or survival rate	2	1% (0.06% to 2.15%)
Anticipated nonrecurring demands did not occur	5	1% (0.31% to 2.97%)
Weapon system was being phased out or reduced	21	8% (5.16% to 11.92%)
A change was made in the implementation schedule of the weapon system	30	6% (3.60% to 8.55%)
Potential support for a new weapon system was available with current item	3	1% (0.17% to 2.84%)
Item was replaced or became obsolete	8	2% (0.93% to 4.80%)
Purchase was for a minimum quantity or value	22	5% (2.72% to 7.23%)
Repair capacity was underutilized	4	1% (0.17% to 2.35%)
Contracts for on-order parts were not changed or terminated	5	1% (0.12% to 2.13%)
No excess was reported	1	<sup>b</sup>
Inaccurate data were used	2	<sup>b</sup>
Other	184	54% (48.79% to 59.29%)

Source: GAO survey of Navy inventory managers.

<sup>a</sup>Reasons are not mutually exclusive; therefore, percentages do not total to 100.

<sup>b</sup>Less than 1 percent.

**Table 7: Estimated Frequency of Reasons for Navy Having Inventory Deficits**

Cause	Sample count	Estimated frequency and 95%, two-sided confidence interval <sup>a</sup>
Demands increased	9	24% (11.39% to 42.23%)
Changes occurred in wear-out or survival rate	1	1% (0.06% to 13.16%)
Item was replaced with substitute item	2	4% (0.40% to 16.81%)
No inventory deficit was reported	1	1% (0.06% to 13.16%)
Qualified supplier was not available	3	9% (1.93% to 24.96%)
Other	27	64% (45.87% to 79.27%)

Source: GAO survey of Navy inventory managers.

<sup>a</sup>Reasons are not mutually exclusive; therefore, percentages do not total to 100.

Responses in the “other” category varied but included issues related to procuring and retaining minimum quantities of parts, obsolescence, or other explanations of demand changes. Regarding parts excess to current requirements, for example, one respondent said the Navy has upgraded to a new module, but support is still required to meet Air Force requirements. Regarding a deficit, for example, one respondent said they are working with a sole source vendor and the estimated shipping date slipped.

In follow-up discussions Navy managers confirmed that changes in demand were the main cause of inventory exceeding current requirements or inventory deficits. In some cases, they attributed these changes to incomplete or inaccurate demand data, owing to a lack of communication among the various key participants in the demand-forecasting process. In several cases, they cited poor communications with other service components that were generating the demand. The following cases illustrate challenges Navy managers face in predicting demands for items:

- An example of an item in excess due to demand changes was the blades used in the F404 engine that goes into the Navy’s F-18 model A/D aircraft. The Navy had 13,852 of these parts valued at \$3.6 million as excess to current requirements. The next higher assembly is now on a contract under which the contractor supplies the item, so the demand for the blades disappeared. Thus, the Navy’s anticipated demand for

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these parts never materialized. In commenting on our draft report, the Navy stated that all 13,852 parts were being offered to the contractor in return for a cost reduction on the contract.

- Another example of an item with inventory excess to current requirements was a special cable assembly also used on the Navy's F-18 model A/D aircraft's forward-looking infrared radar. The item was being phased out by the Navy, and the last purchase was in fiscal year 2006 for six parts valued at \$76,087 to support the Coast Guard's continued use of the item. However, since the Navy did not know the Coast Guard requirements for this item, it did not determine the proper level of inventory to carry for this item.
- An example of an inventory deficit that should have been more predictable because it involved a planned program alteration was a valve assembly used on various ship hulls for firefighting and air conditioning systems. The item is being phased in to support a planned ship alteration. We identified it as having an on-order excess of 16 parts valued at \$77,021 in our analysis as of September 30, 2007, but by March 2008 this item was in a deficit position. This case illustrates the challenges Navy managers face in predicting demand for an item, even when demand is driven by a planned program change.

Navy managers said that demands Navy-wide have been decreasing for reasons they did not fully understand, and they provided data submitted by managers of ships' inventory showing that two-thirds of demand forecasts were incorrect by more than 10 percent. In order to meet materiel availability support goals, managers said, they need to err on the side of having rather than not having the items.

Furthermore, incomplete or inaccurate data can cause widespread problems in cases where the Navy relies on automated data processing for past recurring demand requisition history to predict future customer demands, then adjust these data when changes occur that are significant enough to be flagged. Navy managers said they actively manage items that are in high demand, costly, or identified for other reasons; the remaining items often require less attention. They said that Navy policy allows for automated procurements of all items costing less than \$50,000. In the aviation community, these buys represented an average of about 52 percent of the total buys and 7 percent of the total value of procurements between fiscal years 2005 and 2007. With thousands of items to manage and generally little time to spend on all but the highest value, most significant, or problem items, Navy managers rely on the historical demand data provided electronically from requisitions.

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Navy managers observed that some customers and some secondary inventory items are more predictable than others. They cited problems, including a lack of communication and coordination among key personnel. For example, they said that the nuclear propulsion community is better coordinated because the engineers, contract managers, and inventory managers are collocated and work closely with program officials, maintenance locations, and contractors. However, for aviation and maritime support equipment such as mobile generators or test equipment, a variety of issues have made demands more difficult to predict. For example, support equipment is used on multiple platforms, needs periodic calibration, and may have more obsolescence issues. They observed that having timely, complete, and reliable data, as well as coordinated communications among contract, maintenance, program, inventory, and contractor officials and other suppliers, can improve demand data predictability.

While the Navy recognizes that unpredictable demand is a driving factor in the lack of alignment between inventory and current requirements, it has not systematically evaluated why its demand-based forecasts fluctuate, why demands across the Navy inventory are decreasing, and how demand fluctuations vary among item manager groups or across items. The Navy does not formally track the accuracy of its demand forecasts or what can be done to improve them. Navy officials also said that many Navy secondary inventory items require long production lead times, rendering orders for these items more vulnerable to inaccuracy due to demand fluctuations. In addition, they said that while they could improve demand forecasting, this would increase administrative support costs and would not be affordable across the Navy supply system. However, the Navy could not provide data specifying what these costs would be. In addition, the Navy has not determined the extent to which it could avoid costs by purchasing fewer items in accordance with more accurate, updated demand data.

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### Navy Has Not Adjusted Certain Inventory Management Practices in Response to Demand Unpredictability

Although the Navy acknowledged that demand unpredictability is a driving factor in the lack of alignment between inventory and current requirements, it has not adjusted certain inventory management practices to incorporate flexibility for accommodating demand fluctuations. We identified three specific areas—initial provisioning management, on-order management, and retention management—where current practices contributed to the Navy having significant amounts of inventory in excess of current requirements.

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## Initial Provisioning Practices Can Result in the Purchase of Unneeded Stock

Under DOD's supply chain management regulation, calculated risks may be taken during the initial provisioning for selected items when program uncertainties or other circumstances make such risks acceptable.<sup>17</sup> Navy inventory managers told us they rely on weapon system program managers to identify inventory requirements needed to meet initial provisioning estimates. However, they said these estimates often prove to be inaccurate. For example, configuration changes may be made to the system or parts may last longer or shorter than initially estimated. As a result, some items that are purchased based on the initial provisioning estimates are ultimately not needed to meet requirements. For example:

- One item, a sonar set used on the Los Angeles Class submarine, had nine parts in inventory of which seven (valued at \$69,314) were identified as excess to current requirements. The estimated demand for these parts—which went through initial provisioning in 1991—did not materialize. The parts have been in inventory since that time. Navy managers noted this was not uncommon with initial provisioning.
- Another item, an electronic module used in a number of ship and air combat systems by the Navy and the Air Force, was last purchased in 1988. Nineteen parts were purchased, of which 15 (valued at \$48,363) were currently identified as excess. Initial provisioning demand was based on engineering estimates that proved to be inaccurate. Navy managers said that inaccurate high or low estimates happen with some regularity.

## On-Order Management Practices Limit Flexibility in Modifying Purchases

The Navy's inventory management practices for on-order items limit flexibility in modifying purchase decisions in cases where demand has changed. Modifying purchase decisions can include reducing or canceling the quantities being purchased. The Navy identifies purchase requests and contracts for modification when quantities being purchased exceed the sum of requirements and an added "termination protection level."<sup>18</sup> The amount of a contract that is canceled is the portion that exceeds the

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<sup>17</sup> Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, AP2.2.1.2 (May 2003).

<sup>18</sup> The Navy has established the protection level for items on contract as the greater of the item's economic order quantity or eight quarters (2 years) of 'attrition' demand above the reorder point. For items on purchase requests, this is the greater of the item's economic order quantity or 2 quarters (6 months) of 'attrition' demand above the reorder point. The amount of a contract or purchase request that is cancelled or terminated is the portion that exceeds the reorder point and protection level. Attrition demand is the quarterly forecasted demand times the wear-out rate. The wear-out rate is the percentage of reparable items that fail which will not, through repair, be returned to serviceable condition.

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protection level. Because the protection level often exceeds an item's economic order quantity, purchase requests and contracts for inventory that exceeds requirements often are not considered for cancellation or the amount of a contract that is canceled is limited by a protection level. Thus, while modification of purchase contracts can be triggered when assets exceed protection levels, these protection levels are often set so high that they limit modification actions.

Navy managers said they reduce or cancel purchases only when quantities of an item exceed established protection levels. They added that protection levels provide an effective safeguard against canceling a purchase decision only to have to place new orders when demand for an item increases. In our follow-up discussions with 10 Navy aviation managers who had on-order inventory that exceeded current requirements, none of the items involved a termination action. In one example involving a holdback bar assembly,<sup>19</sup> the Navy had 31 on-order parts valued at \$103,124 that exceeded current requirements. Although items are reviewed at least quarterly for termination, managers took no action on this item because of the established protection level. Also, managers had been informed that some of these items might potentially be needed for use in Iraq.

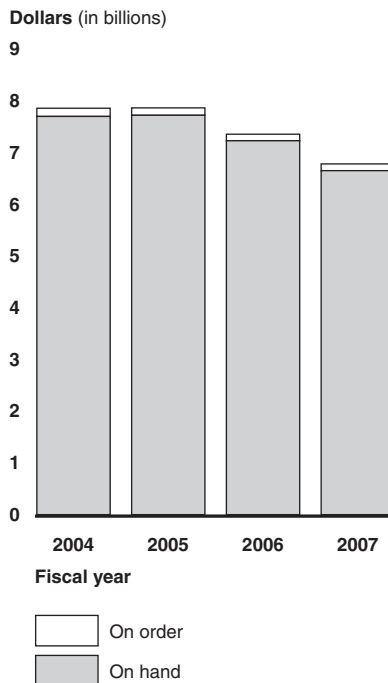
While cancellation of on-order inventory can reduce purchases of unneeded inventory in response to changes in demand, a relatively small proportion of the Navy's total inventory exceeding requirements is on order compared to the amount that is already on hand. As shown in figure 6, about 98 percent of the value of the Navy's secondary inventory that exceeded current requirements was on hand and just 2 percent of the value was on order in the years we reviewed.

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<sup>19</sup>The item is part of the Navy's arresting gear used for the P-3 aircraft.



**Figure 6: Value of On-Hand and On-Order Secondary Inventory which Exceeded Current Requirements (Fiscal Years 2004-2007)**



Source: GAO analysis of Navy data.

Note: Values are expressed in constant fiscal year 2007 dollars, and are less cost recovery rates (overhead charges).

DOD's supply chain materiel management regulation addresses management of on-order items, and includes a number of provisions intended to provide for effective and efficient end-to-end support. For example, when economic order quantity methods are used in making purchase decisions, the regulation requires that every attempt shall be made to purchase materiel under indefinite delivery and indefinite quantity contracts so that the order quantity and delivery times are reduced.<sup>20</sup> Our analysis of Navy inventory data showed that the preponderance of items purchased as economic order quantity was already on hand. Of the \$1.63 billion applied to economic order quantity in fiscal year 2007, about \$1.37

<sup>20</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, C2.6.3.1.2 (May 2003).

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Navy Has Not Adjusted  
Retention Practices in  
Response to Prior  
Recommendations

billion (84 percent) was on hand and \$260 million (16 percent) was on order. More closely managing the purchase of economic order quantities can add some flexibility in minimizing investments in secondary inventory. However, the Navy loses this flexibility once the inventory is delivered.

Although prior studies by our office and LMI have identified weaknesses in DOD components' inventory retention practices, the Navy has not implemented corrective actions recommended in these reports. As a result, the Navy's inventory retention practices have contributed to the significant levels of secondary inventory exceeding current requirements, including a substantial amount of inventory that had no projected demand. As discussed earlier, our analysis showed the Navy annually held about \$1.9 billion of its secondary inventory in economic and contingency retention categories in fiscal years 2004 through 2007.

The Navy has a retention and disposal program aimed at identifying inventory that should be retained and inventory that is potential excess and should be considered for disposal or reutilization. The Navy's inventory retention policy calls for an economic retention level to ensure that an item is available for a specified number of years.<sup>21</sup> Economic retention formulas are applied to inventory items based in part on program status. For example, in a steady program the Navy wants a minimum of three items to be available for economic retention for 8 years. Different formulas would apply to secondary inventory associated with increasing or declining programs. According to Navy managers, they annually review the program status of inventory items to ensure correct economic retention formulas are applied to each.

Additionally, the Navy has contingency retention requirements to preclude disposal of assets that might be needed for future nonrecurring demand, such as outfitting or planned maintenance actions; items used primarily in wartime which have limited use in peacetime; and future foreign military sales. The Navy policy also directs that material normally not be disposed of within 7 years of its material support date with some exceptions,<sup>22</sup> to prevent premature disposal decisions based on initial provisioning

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<sup>21</sup>Naval Supply Systems Command letter to the Commander, Naval Inventory Control Point (03, 05); Subject: Retention Policy, 4111B, dated March 21, 1996.

<sup>22</sup>Material Support Date (MSD) is the date the Navy assumes responsibility for all spares and repair parts needed to support a new weapons system, subsystem, or support equipment end item at Fleet operational sites.

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forecasts. These economic and contingency retention requirements, along with potential excess stock, are to be reviewed on a semiannual basis and prior to disposal and the results of these reviews are to be provided in briefings to the Naval Supply Systems Command prior to the final stratification report.

Prior reports by our office and LMI have identified weaknesses in DOD components' retention practices and recommended corrective actions. In 2001, we reported that DOD components had not properly documented the approaches they have taken in making economic retention decisions, lacked sound analytical support for the maximum levels they used, and had not annually reviewed their methodologies for making economic retention decisions as required by DOD's supply chain regulation.<sup>23</sup> We recommended that DOD establish milestones for reviewing approaches used for making decisions on whether to hold or dispose of economic retention inventory and to annually review their approaches to meet DOD regulations to ensure that they have sound support for determining economic retention inventory levels. In responding to our report, DOD stated that further study of retention practices was needed, noting that the National Defense Authorization Act for Fiscal Year 2000 directed DOD to sponsor an independent study on secondary inventory and parts shortages.<sup>24</sup>

DOD subsequently tasked LMI in 2001 and again in 2003 to examine whether current economic retention policy requirements and procedures could be improved. LMI's review yielded recommendations similar to ours. In 2006, we reported that DOD had yet to implement our 2001 recommendations on economic retention inventory management, and we reiterated the need to implement them.<sup>25</sup> We noted in that report that DOD places emphasis on purging from its inventory items which no longer support its mission and needlessly consume warehouse space. We further found that some DOD components had not followed DOD policies and procedures to ensure they were retaining the appropriate amount of contingency retention inventory.

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<sup>23</sup>GAO, *Defense Inventory: Approach for Deciding Whether to Retain or Dispose of Items Needs Improvement*, [GAO-01-475](#) (Washington, D.C.: May 25, 2001).

<sup>24</sup>National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, §362 (1999).

<sup>25</sup>GAO, *Defense Inventory: Actions Needed to Improve Inventory Retention Management*, [GAO-06-512](#) (Washington, D.C.: May 25, 2006).

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A separate LMI study of the Air Force's economic retention practices identified the need to incorporate new techniques for accommodating demand uncertainty.<sup>26</sup> DOD then tasked LMI to repeat the analysis for the other components and to address the retention of materiel in the DOD supply system. LMI reported in July 2007 that the question of retaining or disposing of inventory is subject to demand uncertainties.<sup>27</sup> It found that the DOD regulation correctly defines the economics of retention and the need to use economic analysis and up-to-date cost factors when deciding what to retain. Among other things, LMI linked retention practices with demand forecasting and called for components to use additional techniques for more accurately determining the probability of future demand or repurchase. For example, it called on the services to determine whether an item with no recent demand history is still part of a weapon system configuration and said that items with extended periods of no demand should be candidates for item reduction. LMI also recommended augmenting traditional demand forecast accuracy metrics with a measure of bias to identify the potential for overforecasting, and adjust forecasting methods accordingly. It noted that some forecast methods have a tendency for positive bias, with the result that forecasts are too high more often than they are too low. This leads to inflated inventory levels, especially for low-demand items which can be harder to sell than high-demand items. LMI called for monitoring demand forecasting methods to identify bias which can lead to overinvestment in inventory.

We found no evidence that the Navy had taken these actions. On the basis of our review, we believe they could strengthen the management of the Navy's secondary inventory. For example, although the Navy continues to have a substantial amount of inventory each year for which it shows no projected demand (about 85,700 unique items valued at over \$1.9 billion in fiscal year 2007), data have not been developed to show whether these items are still part of a current weapon system configuration, have had extended periods of no demand, and should be candidates for item reduction.

In addition, the Navy could not document that it has conducted required annual reviews to validate its retention decision practices. DOD's

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<sup>26</sup>According to LMI, the Air Force sponsored the 2006 study in response to GAO's audit, which found Air Force retention levels were not based on economics.

<sup>27</sup>LMI, *Economic Retention in the Department of Defense, A Risk Perspective*, Report LG608T1 (July 2007).

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regulation states that to ensure that economic and contingency retention stocks correspond with current and future force levels, the components shall review and validate their methodologies for making economic and contingency retention decisions.<sup>28</sup> The review shall occur at least annually, and the inventory management organization commander or designee shall attest to its validity in writing. The methodology used to set economic retention levels should be based on economic analysis that balances the cost of retention and the costs of disposal. Under the regulation, the service components' reviews should focus on better analyses supporting retention decisions by using forecasting models that take into account potential upward or downward trends in demand and/or the uncertainties of predicting long-term demand based on historical data, and improved estimates for costs used in retention decision making. Contingency retention reviews should focus on verifying that the reason for contingency retention still exists and the reason is properly recorded.

Navy officials said briefings provided to the Navy Supply Systems Command prior to the final stratification review include economic retention data. However, we do not believe these briefings fulfill the DOD requirement for an annual review which the commander attests to in writing. In addition, these briefings do not address the elements set out in DOD's regulation, such as validation that retention levels are based on economic analysis balancing retention and disposal costs. Navy officials also said they performed a full study of the execution of the Navy's economic retention policy in 2005. During the study they verified that the model was in compliance with policy. They also performed sensitivity analysis of the model, which confirmed the model continues to perform cost-effective retention computations. They provided a briefing that summarized the results of this study and recommended maintaining economic retention policy "as is," continually monitoring the retention policy to identify methods to improve cost estimates, explore benefits of no-demand options, explore reductions in minimum retention limits, and continue to proactively dispose of obsolete material and monitor DLA warehousing costs. While this study may be useful to the Navy in managing retention inventory, as stated above, we do not believe it fulfills the requirement for an annual review which the commander attests to in writing.

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<sup>28</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, C2.8.1.1.2 (May 2003).

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## Navy Has Not Defined Oversight Role of Chief and Deputy Chief Management Officers Regarding Inventory Management Improvements

Although the Navy has established a chief management officer and deputy chief management officer for business transformation, it has not defined what, if any, role these individuals will play in overseeing inventory management improvement. The costs of DOD's business operations have been a continuing concern. In April 2008, for example, the Defense Business Board raised concerns that DOD had not aggressively reduced the overhead costs related to supporting the warfighter, which it noted accounted for about 42 percent of DOD's total spending each year. The Defense Business Board recommended that DOD align strategies to focus on reducing overhead while supporting the warfighter.<sup>29</sup>

In May 2007, DOD established a chief management officer position with responsibility for improving and evaluating the overall economy, efficiency, and effectiveness of the department's business activities. The Navy also established a chief management officer, effective April 2008. Both DOD and the Navy planned to have a deputy chief management officer actively implementing business transformation by October 2008. Although the Navy's chief management officer and deputy chief management officer would not likely have direct responsibility for inventory management, they have been assigned responsibility for transforming DOD's business operations. Therefore, these newly designated positions provide an opportunity for an enhanced level of oversight of inventory management improvement.

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## Conclusions

The Navy has accumulated and retained levels of secondary inventory each year that exceed current requirements without justifying that these inventory levels are sized to minimize DOD's investment. When the Navy invests in the purchase of inventory items that become excess to its requirements, these funds are not available to meet other military needs. Taking steps to reduce the levels of inventory exceeding requirements could help to ensure that DOD is meeting supply performance goals at least cost. The Navy lacks metrics and goals for tracking and assessing cost efficiency along with supply availability, customer wait time, and other supply performance metrics and goals. Among other things, cost-efficiency metrics and goals could provide a basis for effective

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<sup>29</sup>Defense Business Board, *Task Group Report on Tooth-to-Tail Analysis*, FY08-2 (April 2008). The Deputy Secretary of Defense tasked the board to assess and make recommendations regarding the relationship between the force structure executing the department's major combat and irregular warfare missions ("tooth") and the infrastructure used to manage and support those forces ("tail").

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management and oversight of inventory reduction efforts. Much of the inventory that exceeded current requirements or had inventory deficits resulted from inaccurate demand forecasts, which the Navy attributed to unpredictability of demand. However, the Navy has not systematically evaluated and addressed demand unpredictability or adjusted certain inventory management practices to enhance flexibility in adapting to fluctuations in demand. In the absence of such actions, the Navy will likely continue to purchase and retain items that it does not need and then spend additional resources to handle and store these items. Finally, since inventory management is part of the Navy's broader business operations and transformation, it is reasonable to expect the newly established chief management officer and deputy chief management officer to exercise some level of oversight of the Navy's inventory management improvement efforts. Strengthening the Navy's inventory management—while maintaining high levels of supply availability and meeting warfighter needs—could reduce support costs and free up funds for other needs.

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## Recommendations for Executive Action

To improve the management of the Navy's secondary inventory, we recommend that the Secretary of Defense direct the Secretary of the Navy, in conjunction with the Commander, Navy Supply Systems Command, and the Commander, Naval Inventory Control Point, to take the following four actions:

- Establish metrics and goals for tracking and assessing the cost efficiency of inventory management and incorporate these into existing management and oversight processes.
- Evaluate demand forecasting procedures to identify areas where forecasts have been consistently inaccurate, correct any systemic weaknesses in forecasting procedures, and improve communications among stakeholders, to include promptly relaying changes in programs and other decisions that affect purchases of spare parts. Further, the Commander, Naval Supply Systems Command, and the Commander, Naval Inventory Control Point, should develop an evaluation plan and interim milestones for assessing the impact of ongoing efforts and take additional corrective actions, if warranted, to improve demand forecasting for secondary inventory.
- Revise inventory management practices to incorporate the flexibility needed to minimize the impact of demand fluctuations. Specific attention should be given to revising practices regarding initial provisioning management, on-order management, and retention management. Further, the Commander, Naval Supply Systems Command, and the Commander, Naval Inventory Control Point, should

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develop an evaluation plan and interim milestones for assessing the impact of ongoing efforts and take additional corrective actions, if warranted, to incorporate flexibility into inventory management practices.

- Ensure that required annual reviews validating methodologies used for making retention decisions are performed and documented.

We also recommend that the Secretary of the Navy direct that the Navy's Chief Management Officer and Deputy Chief Management Officer exercise appropriate oversight of Navy inventory management improvement to align improvement efforts with overall business transformation and to reduce support costs.

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## Agency Comments and Our Evaluation

In its written comments on a draft of this report, DOD concurred with our recommendations and identified corrective actions and estimated dates for these actions to be completed. On the basis of DOD's comments, we have modified two of our recommendations. The Navy also provided technical comments, which we have incorporated as appropriate. The department's written comments are reprinted in appendix II.

Although it concurred with our recommendations, DOD took issue with our finding that 40 percent of the Navy's secondary inventory exceeded current requirements and stated that it was important to frame this finding in proper context. DOD commented that 50 percent of the inventory we portrayed as excess to current requirements is applicable to the 2-year budget horizon, another 10 percent is retained as economic retention stock which is less expensive to retain than to dispose and later procure, and 30 percent is contingency retention stock which is held for specific contingencies, leaving only 10 percent identified as potential excess. It said the department will continue to focus on reducing potential excess, as well as improving forecasts and ensuring a correct balance between the cost to hold inventory and the cost to dispose and repurchase. For the purposes of our analysis, we defined excess inventory as that portion of the inventory that exceeds the requirements objective, which is defined in the department's supply chain materiel management regulation. As we noted in the report, we selected the requirements objective as our baseline because it includes the requirements used to determine when to order new parts. In other words, if the Navy had enough parts to meet the requirements objective, it would not purchase new parts. The inventory categories and data cited by DOD in its comment are discussed in the report. The department's comment places too little emphasis on the need to reduce the accumulation and retention of inventory that exceeds



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current requirements, which amounted to about \$7.5 billion each year. When the Navy invests in inventory sooner than it is needed, the chances increase that more inventory will become excess, and funds used to purchase inventory before it is needed are not available to meet other military needs. Thus, we continue to believe that taking steps to reduce the high levels of inventory exceeding current requirements could help ensure that the Navy is meeting supply performance goals at least cost. Some of the actions that DOD identified in its responses to our specific recommendations should help.

DOD concurred with our recommendation that the Navy establish metrics and goals for tracking and assessing the cost efficiency of inventory management. It said the Navy Supply Systems Command will incorporate into existing management and oversight processes a metric and goal for tracking and assessing the cost efficiency of inventory management, and identified October 31, 2009, as the estimated completion date for this action.

DOD concurred with our recommendation that the Navy improve demand forecasting procedures and communications among stakeholders. However, DOD cited ongoing Navy efforts to evaluate current forecasting procedures and tools, implement a long-planned enterprise business information system, and continue its annual training of inventory managers, and it did not identify additional corrective actions beyond those already planned. DOD estimated these actions would be completed by September 30, 2010. While the ongoing Navy efforts cited by DOD in its comment may have a positive impact, we continue to believe that the Navy could derive benefits from a systemic evaluation of its demand forecasting procedures. Therefore, the Navy should establish an evaluation plan and interim milestones for assessing the impact of ongoing efforts and take additional corrective actions, if warranted. We have modified our recommendation accordingly.

DOD concurred with our recommendation that the Navy revise inventory management practices to incorporate flexibility needed to minimize the impact of demand fluctuations. However, DOD cited ongoing Navy efforts to improve inventory management practices, including those related to initial provisioning and on-order inventory management, and estimated these corrective actions would be completed by September 30, 2010. While the ongoing Navy efforts cited by DOD in its comment may have a positive impact, its comment provided no indication that the Navy plans any changes to the way it conducts business. Therefore, the Navy should establish an evaluation plan and interim milestones for assessing the

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impact of ongoing efforts and take additional corrective actions, if warranted. We have modified our recommendation accordingly.

DOD concurred with our recommendation that the Navy perform and document required annual reviews validating methodologies used for making retention decisions. According to DOD, the Navy Supply Systems Command will modify its management internal control program to assure this requirement is met and estimated this corrective action would be completed by May 31, 2009. We believe this planned action is responsive to our recommendation.

DOD concurred with our recommendation that the Navy direct its Chief Management Officer and Deputy Chief Management Officer to exercise appropriate oversight of Navy inventory management improvement to align improvement efforts with overall business transformation and to reduce support costs. DOD said the Navy is developing a business transformation implementation strategy to align with Office of the Secretary of Defense actions in this area. Through this development process, the Navy will determine the appropriate role the Chief Management Officer should exercise in inventory management oversight. DOD estimated that it would complete this corrective action by April 30, 2009. We believe this planned action is responsive to our recommendation.

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We are sending copies of this report to interested congressional committees; the Secretary of Defense; the Secretary of the Navy; the Secretary of the Air Force; the Director, Defense Logistics Agency; the Under Secretary of Defense for Acquisition, Technology, and Logistics; and the Director, Office of Management and Budget. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov/>.

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If you or your staff have any questions concerning this report, please contact me on (202) 512-8365 or [solisw@gao.gov](mailto:solisw@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix III.

A handwritten signature in black ink, appearing to read 'W. Solis', with a long horizontal flourish extending to the right.

William M. Solis  
Director, Defense Capabilities and Management

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# Appendix I: Scope and Methodology

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To determine the extent to which the Navy's on-order and on-hand secondary inventory reflected the amount needed to support current requirements, we obtained the Navy's Central Secondary Item Stratification Budget Summary and item-specific reports for September 30 of each fiscal year from 2004 through 2007. The stratification reports serve as a budget request preparation tool and a mechanism for matching assets to requirements. Our analysis was based on analyzing the Navy's item stratifications within the opening position table of the Central Secondary Item Stratification Reports.<sup>1</sup> To validate the data in the budget stratification reports we generated summary reports using electronic data and verified our totals against the summary stratification reports obtained from the Navy. After discussing the results with Navy managers, we determined that the data were sufficiently reliable for the purposes of our analysis and findings. Upon completion of the data validation process, we revalued the Navy's secondary inventory items identified in its budget stratification summary reports because these reports value useable items and items in need of repair at the same rate, and do not take into account the cost of repairing broken items. We computed the new value for items in need of repair by subtracting repair costs from the unit price for each item. We also removed overhead charges, called cost recovery rates, from the value of each item. Using information obtained from Navy managers, we identified and removed from our data set items managed under Performance Based Logistics (PBL) contracts. According to the Navy, published stratification data on PBL items are inaccurate because the Navy does not determine requirements for these items.

Table 8 summarizes the Navy inventory data we used, showing the annual averages for items, parts, and value of the Navy's inventory, organized by supply cognizance code.

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<sup>1</sup>The opening position table shows current requirements as of a certain cutoff date and does not include any forecasted requirements or simulations.

**Table 8: Navy Secondary Inventory by Cognizance Code (Annual Average for Fiscal Years 2004-2007)**

Description of cognizance code	Items	Parts	Value
1H - Navy Working Capital Fund Material <sup>a</sup>	70,455	14,094,707	\$722,288,668.53
1R - Aeronautical, Photographic, and Meteorological Material <sup>a</sup>	25,371	3,777,093	1,029,257,926.32
3H - Field Level Repairables <sup>a</sup>	1,898	68,684	83,537,920.50
7E - Depot Level Repairable Ordnance Equipment, Ordnance Repair Parts and Air Missile Repair Parts Related to NAVAIR Equipment <sup>b</sup>	3,968	19,529	173,843,991.40
7G - Depot Level Repairable Electronic Material <sup>b</sup>	9,950	58,876	350,106,408.27
7H - Depot Level Repairable Shipboard and Base Equipment <sup>b</sup>	40,400	322,350	2,603,130,018.93
7R - Aeronautical Depot Level Repairable Spares <sup>b</sup>	33,571	706,708	13,753,431,722.51
7Z - General Purpose Electronic Test Equipment to Support Various Naval Systems Commands Equipment/Programs <sup>b</sup>	853	4,897	19,239,558.23
<b>Total</b>	<b>186,465</b>	<b>19,052,843</b>	<b>\$18,734,836,214.69</b>

Source: GAO analysis of Navy data.

Notes: Values are expressed in constant fiscal year 2007 dollars and are less cost recovery rates (overhead charges).

<sup>a</sup>Consumable items.

<sup>b</sup>Reparable items.

In presenting the value of inventory in this report, we converted then-year dollars to constant fiscal year 2007 dollars using Department of Defense (DOD) Operations and Maintenance price deflators.<sup>2</sup>

We considered Navy inventory to exceed current requirements if more inventory than needed is available to satisfy its requirements based on the opening position table of the Navy's budget stratification report. Collectively, these requirements are referred to by DOD as the "requirements objective," defined as the maximum authorized quantity of stock for an item.<sup>3</sup> However, if more inventory is on hand or on order than is needed to satisfy its requirements, the Navy does not consider the inventory beyond current requirements to be unneeded. Instead, the Navy uses this inventory to satisfy future demands over a 2-year period,

<sup>2</sup>DOD Comptroller, *National Defense Budget Estimates for FY 2009* (March 2008) p. 47.

<sup>3</sup>Department of Defense Supply Chain Materiel Management Regulation 4140.1-R, AP1.1.126 (May 2003). The Navy refers to this inventory level as its "total requirements objective." The authorized additive levels cited in the definition include wartime reserve stock and inventory for acquisition lead times.

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economic retention requirements,<sup>4</sup> and contingency retention requirements.<sup>5</sup> Only after applying inventory to satisfy these additional requirements would the Navy consider that it has more inventory than is needed and consider this inventory for potential reutilization or disposal.<sup>6</sup> We do not agree with the Navy's practice of not identifying inventory used to satisfy these additional requirements as excess because it overstates the amount of inventory needed to be on hand or on order by billions of dollars. The Navy's requirements determination process does not consider these additional requirements when it calculates the necessary amount of on-hand and on-order inventory, which means that if the Navy did not have enough inventory on hand or on order to satisfy these additional requirements, the requirements determination process would not result in additional inventory being purchased to satisfy these requirements.

We consider the Navy to have inventory deficits if levels of on-hand inventory are insufficient to meet the reorder level, which the Navy defines as the level of on-hand assets at the time an order must be placed to achieve the acceptable stock-out risk.<sup>7</sup> Normally, item managers place an order for the number of parts below the reorder level, plus an economic order quantity. However, due to variation in acquisition lead times, these parts may not be delivered when they are needed. We did not include the procurement cycle (economic order quantity) requirement when calculating inventory deficits, because this requirement defines the maximum level of on-hand or on-order inventory that may be above the reorder level, and does not define a minimum level of on-hand inventory.<sup>8</sup> For comparison purposes with the excess inventory, we calculated the amount of inventory that the Navy would have to acquire to meet

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<sup>4</sup>Economic retention inventory includes items that have been determined to be more economical to keep than to dispose of because they are likely to be needed in the future. Economic retention inventory is not applied to on-order inventory not needed to satisfy requirements.

<sup>5</sup>Contingency retention inventory exceeds economic retention inventory (items that are more economical to keep than to dispose of) and would normally be processed for disposal but is retained for specific contingencies.

<sup>6</sup> Potential reutilization and/or disposal materiel exceeds contingency retention and has been identified for possible disposal but with potential for reutilization.

<sup>7</sup> Naval Inventory Control Point Instruction 4440.458A, Stratification Scrub, Enclosure (7) p. 6 (July 31, 2002).

<sup>8</sup> Naval Supply Systems Command Instruction 4440.47J, Stratification of Assets, Enclosure (1) p. 3 (Aug. 6, 1984).

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acquisition lead time and economic order quantity in order to achieve current operating requirements for these items where there was a deficit.

To determine the extent to which the Navy's on-hand and on-order secondary inventory reflects the amount of inventory needed to support requirements, we reviewed DOD and Navy inventory management policies, past GAO products on DOD and Navy inventory management practices for secondary inventory items, and other related documentation. We also created a database which compared the Navy's current inventory to its current requirements and computed the amount and value of secondary inventory exceeding or not meeting current operating requirements. We also determined how the Navy applied the inventory that exceeded current requirements to future demands, economic retention, contingency retention, or potential reutilization/disposal. We determined how much of the Navy's inventory was in serviceable condition, and compared this portion to the inventory in unserviceable condition. We also used codes provided by the Navy to determine the program status of items we identified as meeting or exceeding current requirements.

We developed a survey to estimate the frequency of reasons why the Navy maintained inventory items that were not needed to support current requirements or did not meet requirements. The survey asked general questions about the higher assembly (component parts) and/or weapon systems that the items support, and the level of experience of the item manager with responsibility for the item. In addition, we asked survey respondents to identify the reason(s) why inventory exceeded current requirements or was in deficit. We provided potential reasons which we identified during our discussions with Navy managers from which they could select. Since the list was not exhaustive, we provided an open-ended response option to allow other reasons to be provided. In addition to an expert technical review of the survey by a survey methodologist, we conducted pretests with Navy managers for aviation and maritime items in Philadelphia and Mechanicsburg, Pennsylvania, prior to sending out the final survey instrument. We revised the survey accordingly based on findings from the pretests.

We e-mailed this electronic survey to specific Navy managers in charge of sampled unique aviation and maritime items at the Navy's Inventory Control Point locations in Philadelphia and Mechanicsburg, Pennsylvania. We conducted this survey from May 2008 through July 2008. To estimate the frequency of reasons for inventory not needed to meet requirements and inventory deficits, we drew a stratified random probability sample of 424 unique items—353 unique items with on-hand inventory not needed to

support current requirements, 31 unique items with on-order inventory not needed to support current requirements, and 40 unique items with inventory deficits—from a study population of 126,331 items (112,567 with inventory not needed to meet current requirements and 13,764 with inventory deficits). These categories identified a combined value of \$6.8 billion of inventory not needed to meet current requirements. All of these items met our criteria to be included in our study population of items not needed to meet current requirements. Additionally, based on our analysis of the stratification data, all of the 13,764 unique items with inventory deficits, valued at \$462 million, met our criteria to be included in our inventory deficit study population. We stratified using the scheme shown in table 9, dividing the on-hand and on-order excess into 3 substratum each by the amount of supply on hand and stratifying within Philadelphia and Mechanicsburg. With the inclusion of a stratum for inventory deficit items within each office, our sample contained 14 total strata. The divisions of the population, sample, and respondents across the strata, as well as the number of responses by stratum, are also shown in table 9.

**Table 9: Sample Disposition for Fiscal Year 2007 Items**

<b>Stratum of items</b>	<b>Total population</b>	<b>Total sample size</b>	<b>Number of responses</b>
Philadelphia on-hand excess (0 to 2 years of supply)	3,538	18	16
Philadelphia on-hand excess (more than 2 years of supply)	4,113	21	21
Philadelphia on-hand excess (no demand or nonrecurring demand only)	28,566	142	141
Philadelphia on-order excess (0 to 2 years of supply)	1,064	6	6
Philadelphia on-order excess (more than 2 years of supply)	156	5	5
Philadelphia on-order excess (no demand or nonrecurring demand only)	321	5	5
Philadelphia on-hand deficits	2,680	14	14
Mechanicsburg on-hand excess (0 to 2 years of supply)	5,364	13	13
Mechanicsburg on-hand excess (more than 2 years of supply)	9,989	24	24
Mechanicsburg on-hand excess (no demand or nonrecurring demand only)	57,834	135	132
Mechanicsburg on-order excess (0 to 2 years of supply)	1075	5	5
Mechanicsburg on-order excess (more than 2 years of supply)	121	5	5
Mechanicsburg on-order excess (no demand or nonrecurring demand only)	426	5	5
Mechanicsburg on-hand deficits	11,084	26	26
<b>Total</b>	<b>126,331</b>	<b>424</b>	<b>418</b>

Source: GAO analysis of Navy budget stratification data and survey responses.

We sent 424 electronic surveys—one for each item in the sample—to the Navy managers identified as being responsible for these items. Inventory



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control for three of the items in our sample had recently been transferred to the Defense Logistics Agency, so we treated these cases as out of scope. We did not receive completed data collection instruments for 3 of the remaining items in our sample. We received 418 usable responses to our surveys, providing a total response rate of 98.6 percent. Each sampled item was subsequently weighted in the final analysis to represent all the members of the target population.

Because we followed a probability procedure based on random selections, our sample of unique items is only one of a large number of samples that we might have drawn. Because each sample could have provided different estimates, we express our confidence in the precision of our particular sample's results in 95 percent confidence intervals. These are intervals that would contain the actual population values for 95 percent of the samples we could have drawn. As a result, we are 95 percent confident that each of the confidence intervals in this report will include the true values in the study population. All percentage estimates from our sample have margins of error (that is, widths of confidence intervals) of plus or minus 5 percentage points or less, at the 95 percent confidence level unless otherwise noted.

In addition to sampling errors, the practical difficulties of conducting any survey may introduce errors, commonly referred to as nonsampling errors. For example, difficulties in how a particular question is interpreted, in the sources of information that are available to respondents, or in how the data are entered into a database or were analyzed can introduce unwanted variability into the survey results. We took steps in the development of the survey, the data collection, and the data analysis to minimize these nonsampling errors. We reviewed each survey to identify unusual, incomplete, or inconsistent responses and followed up with item management specialists by telephone to clarify those responses. In addition, we performed computer analyses to identify inconsistencies and other indicators of errors and had a second independent reviewer for the data analysis to further minimize such error.

To determine reasons for the types of answers given in the surveys, we held additional on-site interviews with Navy inventory managers on 70 of the items in our sample. We chose an equal number of aviation and maritime items based on the highest value of inventory to identify 10 each from on-hand, on-order, and deficits. We also held follow-up discussions on 10 other items where we found that demand had been increasing, yet there were excess parts; or conversely where demand had been decreasing, yet there was an inventory deficit. These cases were atypical

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because, according to Navy managers, demand increases would likely lead to deficits, and, conversely, demand decreases would likely lead to increases in inventory excess to requirements. These included 5 aviation items and 5 maritime items based on the pattern of demand forecasts we observed for these items from fiscal year 2004 through 2007. During these discussions we obtained additional detailed comments and documentation related to demand, demand forecasting, acquisitions, terminations, and retention and disposal actions.

We conducted this performance audit from November 2007 to December 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. On the basis of information obtained from the Navy on the reliability of its inventory management systems' data, and the survey results and our follow-up analysis, we believe that the data used in this report were sufficiently reliable for reporting purposes.

# Appendix II: Comments from the Department of Defense



DEPUTY UNDER SECRETARY OF DEFENSE FOR  
LOGISTICS AND MATERIEL READINESS  
3500 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3500

NDV 20 2008

Mr. William M. Solis  
Director, Defense Capabilities and Management  
U.S. Government Accountability Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Mr. Solis:

This is the Department of Defense (DoD) response to the GAO draft report, GAO-09-103, "DEFENSE INVENTORY: Management Actions Needed to Improve the Cost Efficiency of the Navy's Spare Parts Inventory," dated October 24, 2008 (GAO Code 351104). Detail comments on the report recommendations are enclosed.

While the Department concurs with the recommendations in the report, it is important to frame the Government Accountability Office's (GAO) basic premise that 40 percent of the Navy's Secondary Inventory exceeds current requirements, in proper context. Half of the inventory GAO portrays as excess to current requirements is applicable to the 2 year budget horizon. Thus 80 percent of the inventory has a requirement within the next two years. Another 10 percent is retained as Economic Retention Stock, less expensive to retain than to dispose and later procure, or Contingency Retention Stock, held for specific contingencies. This leaves only 10 percent as potential excess. The Department continues its focus on reducing potential excess, as well as improving forecasts and ensuring a correct balance between the cost to hold inventory and the cost to dispose and repurchase.

  
Jack Bell

Enclosure:  
As stated



**GAO DRAFT REPORT – DATED October 24, 2008  
GAO CODE 351104/GAO-09-103**

**"DEFENSE INVENTORY: Management Actions Needed to Improve the Cost  
Efficiency of the Navy's Spare Parts Inventory"**

**DEPARTMENT OF DEFENSE COMMENTS  
TO THE RECOMMENDATIONS**

**RECOMMENDATION 1:** The GAO recommends that the Secretary of Defense direct the Secretary of the Navy, in conjunction with the Commander, Navy Supply Systems Command and the Commander, Naval Inventory Control Point, to establish metrics and goals for tracking and assessing the cost efficiency of inventory management and incorporate these into existing management and oversight processes.

**DOD RESPONSE:** Concur. The Navy Supply Systems Command (NAVSUP) will incorporate into existing management and oversight processes a metric and goal for tracking and assessing the cost efficiency of inventory management. Estimated completion date for corrective action is October 31, 2009.

**RECOMMENDATION 2:** The GAO recommends that the Secretary of Defense direct the Secretary of the Navy, in conjunction with the Commander, Navy Supply Systems Command and the Commander, Naval Inventory Control Point, to evaluate demand forecasting procedures to identify areas where forecasts have been consistently inaccurate, correct any systemic weaknesses in forecasting procedures, and improve communications among stakeholders, to include promptly relaying changes in programs and other decisions that affect purchases of spare parts.

**DOD RESPONSE:** Concur. NAVSUP will continue to evaluate demand forecasting procedures and tools such as Statistical Demand Forecasting and demand re-centering to identify opportunities to improve demand forecast accuracy. The Navy expects to gain efficiencies in improved forecasting with the implementation of the Single Supply Solution (Navy ERP 1.1) scheduled for implementation in February 2010. NAVSUP will also continue annual training of Inventory Managers to reinforce the importance of communication with stakeholders. Estimated completion date for corrective action is September 30, 2010.

**RECOMMENDATION 3:** The GAO recommends that the Secretary of Defense direct the Secretary of the Navy, in conjunction with the Commander, Navy Supply Systems Command and the Commander, Naval Inventory Control Point, to revise inventory management practices to incorporate flexibility needed to minimize the impact of

demand fluctuations. Specific attention should be given to revising practices regarding initial provisioning management, on-order management, and retention management.

**DOD RESPONSE:** Concur. NAVSUP will continue to evaluate various methods of demand forecasting, including Statistical Demand Forecasting, Kendall S, and exponential smoothing techniques to minimize the impact of demand fluctuations. NAVSUP will continue to raise concerns and challenge questionable initial provisioning demand forecasts during maintenance plan development meetings and provisioning conferences before items are established. For on-order management, NAVSUP will continue to monitor the impact of demand changes and aggressively enforce contract termination policies when it is cost efficient to do so. Estimated completion date for corrective action is September 30, 2010.

**RECOMMENDATION 4:** The GAO recommends that the Secretary of Defense direct the Secretary of the Navy, in conjunction with the Commander, Navy Supply Systems Command and the Commander, Naval Inventory Control Point, to ensure that required annual reviews validating methodologies used for making retention decisions are performed and documented.

**DOD RESPONSE:** Concur. NAVSUP currently performs annual reviews to validate retention decisions as evident by the \$7.3 billion or 28 percent reduction in Secondary Inventory items between Fiscal Years 2004 and 2007. However, NAVSUP will add an assessable unit to their Management Internal Control program that will assure the methodology for making retention decisions are reviewed and documented annually. Estimated completion date for corrective action is May 31, 2009.

**RECOMMENDATION 5:** The GAO recommends that the Secretary of the Navy direct that the Navy's Chief Management Officer and Deputy Chief Management Officer exercise appropriate oversight of Navy inventory management improvement to align improvement efforts with overall business transformation and to reduce support costs.

**DOD RESPONSE:** Concur. The Department of the Navy (DON) is actively developing a Business Transformation implementation strategy to comply with legislation and align with Office of Secretary of Defense actions in this area. Through this development process, the DON will determine the appropriate role the Chief Management Officer should exercise in inventory management oversight. Estimated completion date for corrective action is April 30, 2009.

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# Appendix III: GAO Contact and Staff Acknowledgments

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## GAO Contact

William M. Solis, (202) 512-8365

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## Acknowledgments

In addition to the contact named above, Thomas Gosling, Assistant Director; Carl Barden; Lionel C. Cooper, Jr.; Foster Kerrison; Carl Ramirez; Minnette Richardson; Steve Pruitt; and Cheryl Weissman made key contributions to this report.

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